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ACTUAL WEIGHT AND BALANCE REPORT

BOILERPLATE NO. 3

AIRPLANE DROP - PARACHUTE TEST

CONTRACT 9-150

(U)

REISSUED 11 JUNE 1963



PREPARED BY:

WEIGHT CONTROL GROUP

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NORTH AMERICAN AVIATION, INC.
SPACE and INFORMATION SYSTEMS DIVISION

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CLASSIFICATION CHANGE

TO UNCLASSIFIED

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~~CONFIDENTIAL~~ACTUAL WEIGHT AND BALANCE REPORTBOILERPLATE NO. 3AIRPLANE DROP - PARACHUTE TESTINTRODUCTION

The Boilerplate No. 3 Command Module actual weight and balance determination was conducted by the Weight Control Group personnel at the Space and Information Systems Division of North American Aviation, Inc. NASA representatives were present to witness the weighing.

The weight, center of gravity and inertia summary presents data for the following conditions:

1. The net adjusted weight prior to modifications.
2. The initial condition after the module is dropped from the airplane.
3. After the forward heat shield is jettisoned and the drogue chute deployed.
4. After the pilot chutes and main chutes are deployed.

The actual weight and balance from Page 3 shows the gross (as weighed) and the net adjusted weight with the known corrections at the time of actual weighing. Since the time of actual weighing additional modifications were made, as shown on Page 2. Further weight adjustments are to be made in the field including Northrop-Ventura required items, as well as N.A.A. structural revisions not shown on Pages 2 and 3. Prior to each drop, weight and center of gravity will be completed incorporating all known changes. At this time, it will be determined whether any changes in the ballast weight and center of gravity will have to be made to make the Command Module conform to the target conditions.

Additional actual weight and balance determinations will be made in the field at various times and will be incorporated as an appendix to this report.

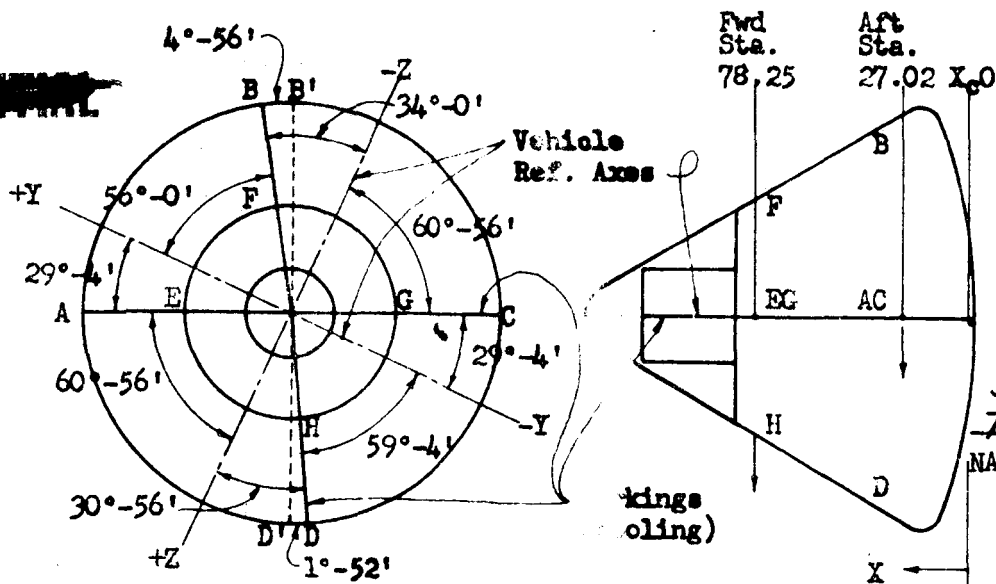
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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY(CALCULATED VALUES)COMMAND MODULE - BOILERPLATE NO. 3AIRPLANE DROP NO. 1 - PARACHUTE TEST

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT. ²)		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
NET ADJUSTED WEIGHT (From page 3)	9476	1043.4	1.0	7.6	5059	4373	4153
MODIFICATIONS							
LESS: B16-301056-65 Ring	-5	1107.1	0.0	0.0	-	-	-
LESS: B16-301056-75 Ring	-4	1108.8	0.0	0.0	-	-	-
PLUS: B16-306083 Ring	+19	1107.6	0.0	0.0	-	-	-
PLUS: N-V Stabilization Fittings	+45	1076.9	3.3	-4.0	-	-	-
PLUS: N-V Modifications	+5	1051.0	-24.0	0.0	-	-	-
INITIAL - DROP NO. 1	9536	1043.6	1.0	7.5	5062	4520	4299
LESS: Forward Cover	-378	1102.1	1.1	3.0	86	43	49
LESS: Drogue Chute	-28	1091.0	9.8	-22.0	-	-	-
PRIOR TO MAIN CHUTE DEPLOYMENT-DROP NO. 1	9130	1041.1	0.9	7.8	4968	4228	4009
LESS: Main Chutes	-411	1091.5	-1.1	7.6	43	16	35
IMPACT - DROP NO. 1	8719	1038.8	1.0	7.8	4924	3681	3441

NOTES: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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*Forward fittings deducted from gross (35 lbs.)

ACTUAL WEIGHT & BALANCE						Name: J. A. Hughes			
BOILERPLATE NO. 3						Date: 6 April 1963			
DESCRIPTION	+CORR	Aver. Read.	WEIGHT	LONG.	MOM.	LAT.	MOM.	VERT.	MOM.
Fwd Jack Position	G	- 9	*3199	3190	78.85	251532		0	0
	F	-14	*3189	3175	78.85	250249	4.15	13176	
Aft Jack Position	D	+ 1	3775	3776	27.02	102028		76.08	287278
	C	- 8	3229	3221	27.02	87031	-76.12	-245183	
Aft Jack Position	B	- 6	2968	2962	27.02	80033		-75.84	-224638
	A	- 4	3535	3531	27.02	95408	76.12	268780	
GROSS (as weighed)	TOTAL G + D + B		9928	43.67	433593			6.31	62640
	TOTAL F + C + A		9927	43.59	432788	3.70	36773		
Transfer to Vehicle Reference Axes									
Y = (LATERAL ARM)(cos 29° - 4') - (VERTICAL ARM)(sin 29° - 4')									
Z = (LATERAL ARM)(sin 29° - 4') + (VERTICAL ARM)(cos 29° - 4')									
Y = (3.70)(.87406) - (6.31)(.48583) = .17									
Z = (3.70)(.48583) + (6.31)(.87406) = 7.31									
DESCRIPTION	WEIGHT	X	WX	Y	WY	Z	WZ		
TRANSFERRED GROSS (as weighed)	9927	43.63	433191	.17	1688	7.31	72566		
Corrections:									
LESS: Aft Fittings	-47	27.0	-1269	-.85	40	-.55	26		
LESS: Internal Ballast	-489	51.9	-25379	19.30	9438	1.20	-587		
PLUS: Fwd. and Aft Strakes	40	82.7	3308	.00	0	.00	0		
PLUS: N-V Batteries, Antennas, etc.	45	37.3	1679	29.35	-1321	-2.76	-124		
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NET (ADJUSTED) ADJUSTED WEIGHT	9476	43.43	411530	1.04	9845	7.59	71881		